SmartSwitch 9000
9H531-18 and 9H532-18
18 Port Fast Ethernet Module
User's Guide

9033185-01

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Order Number: 9033185-01 August 1999

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Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG13 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

Manufacturer	Legal Representative in Europe
Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Compliance Engineering Manager	Managing Director - E.M.E.A.
Title	Title
Rochester, NH, USA	Newbury, Berkshire, England
Location	Location

Contents

Appendix A GPIM Specifications

Chapter 1

Introduction

The 9H531-18 and 9H532-18 (Figure 1-1) are switching modules for the SmartSwitch 9000. Each module has 18 ports.

The 9H531-18 has:

- 16 MT-RJ 100 Mbps multimode fiber Ethernet ports
- 2 Gigabit Ethernet ports supporting hot-swappable GPIMs of either multimode or single mode fiber

The 9H532-18 has:

- 16 RJ45 10/100 Mbps Unshielded Twisted Pair (UTP) Ethernet ports
- 2 Gigabit Ethernet ports supporting hot-swappable GPIMs of either multimode mode or single mode fiber

The 10/100 Ethernet ports can operate in either half or full duplex mode. The Gigabit Ethernet ports operate only in full duplex mode and operate only at 1000 Mbps.

Network management information is available through a variety of methods. All information based on Simple Network Management Protocol (SNMP) is accessible either via an in-band (Front Panel port), Side Band (SMB-10), or out-of-band, via the Environmental Module's COM ports. Serial Line Internet Protocol (SLIP) or Point-to-Point Protocol (PPP) is supported by the Environmental Module's COM ports. For more information on the SMB-10, SLIP or PPP refer to the *SmartSwitch 9000 Local Management User's Guide*.

The 9H531-18 and 9H532-18 also feature front panel LANVIEW™ Diagnostic LEDs to offer at-a-glance status information about each front panel port as well as the operation of the overall module.

Features

Processor

The 9H531-18 and 9H532-18 modules are equipped with an advanced Intel i960 microprocessor. This microprocessor provides a platform for all management functions such as Spanning Tree, RMON, and MIB support, within a scalable RISC-Based architecture.

Management

Management of the 9H531-18 and 9H532-18 modules and SmartSwitch chassis and any optional equipment is accomplished using the Local Management application or remote SNMP management stations. Local Management is accessible through the RS232 COM port on the front panel using a local VT100 terminal, or a remote VT100 terminal via a modem connection, and in-band via a Telnet connection. In-band remote management is possible through any SNMP compliant Network Management Software.

Local Management provides the ability to manage the 9H531-18 and 9H532-18. Local Management information for non-Ethernet HSIMs or VHSIMs is included in their respective user's guide. For details on how to get manuals, refer to the Related Manuals section in the Introduction.

WebView

The 9H531-18 and 9H532-18 modules can be managed by Cabletron WebView, a browser-based utility. There is no software to install as this management capability is built into each module. For more information see the Cabletron Systems *WebView User's Guide*.

Connectivity

The 9H531-18 and 9H532-18 modules have two interfaces to INB A and B backplanes, and 18 front port connections. The INB interfaces are fixed connections to INB-A and B that allow the modules to communicate with other SmartSwitch 9000 modules supporting various LAN technologies including, Token Ring, FDDI, Ethernet, WAN, Fast Ethernet and ATM. The 9H531-18 is configured with sixteen MT-RJ multimode fiber connectors (compliant with the 802.3u IEEE 100Base-FX specifications) and two Gigabit Uplink Ports. The 9H532-18 is configured with sixteen RJ45 UTP connectors and two Gigabit Uplink Ports. The sixteen RJ45 connectors (compliant with IEEE 802.3u) provide sixteen IEEE 10Base-T / 100Base-TX Ethernet ports. The two Gigabit, GPIM connectors (compliant with IEEE 802.3z) provide support for multimode, single mode fiber. GPIMs are not included with the module and are purchased separately. GPIMs are Hot Swappable, i.e., the user can plug a GPIM into the front of the module without taking the module out of the chassis. Currently supported GPIMs include: multimode fiber (GPIM-01) and single mode fiber (GPIM-09).

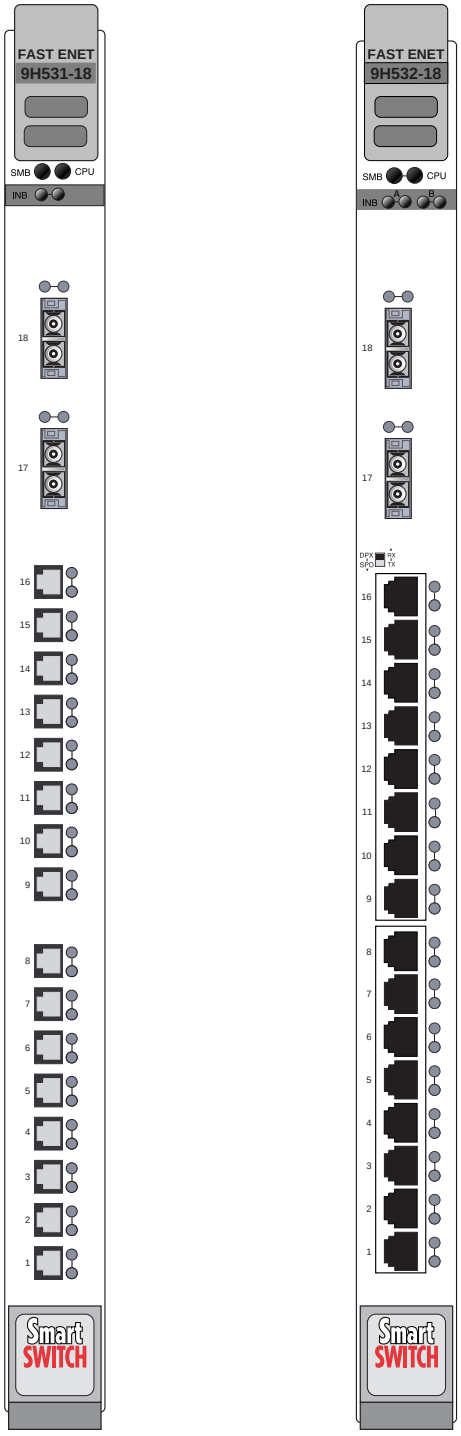


Figure 1-1. The 9H531-18 and 9H532-18 Module

Auto-negotiation

The auto-negotiation feature allows the module to automatically use the fastest rate supported by the device at the other end (either 10 Mbps or 100 Mbps at either half or full duplex). To negotiate duplex, the 9H532-18 module and the attached device must be configured for auto-negotiation. If only the 9H532-18 is configured for auto-negotiation, the module will set the connection to half duplex at either the 10 Mbps or 100 Mbps rate. The 9H531-18 supports only 100 Mbps rate. This technology is similar to how modems negotiate transmission speed, finding the highest transmission rate possible. Similarly, auto-negotiation determines the highest common speed between two devices and communicates at that speed. If no common speed is detected, the device will be partitioned.

Remote Monitoring (RMON)

The 9H531-18 and 9H532-18 support all nine Ethernet RMON groups. The Statistics, Alarms, Events and History groups are enabled on all ports by default.

Cabletron Systems RMON Actions is a vendor-specific extension of RMON and provides the ability to set an "Action" on any SNMP MIB variable. The Action can be triggered by setting an RMON Event and/or Alarm. An example of an Action would be to turn off a MIB-2 interface if a broadcast threshold is crossed.

Broadcast Suppression

Broadcast Suppression enables a user to set a desired limit of receive broadcast frames per port/per second to be forwarded out the other ports on the module up to the set limit. Any broadcast frames above this specified limit are dropped. In the event that broadcast frames are being suppressed, multicast and unicast frames continue to be switched.

Port Redirect Function

The Port Redirect function, also referred to as "Port Mirroring," is a troubleshooting tool used to map traffic from a single source port to a destination port within the chassis. This feature allows all packets, including those with errors, to be copied and sent to an analyzer or RMON probe. The analyzer or RMON probe will see the data as if it is directly connected to the LAN segment of the source port.

Flow Control

Flow Control is a method of managing the flow of frames between two devices. It ensures that a transmitting device does not overwhelm a receiving device with data. This enables the receiving device to communicate with the transmitting device, and to have it pause its transmission while the receiving device processes the frames already received. Flow control can be enabled or disabled on a port-by-port basis. Both devices must support the IEEE 802.3x standard for flow control to work.

Frame based 802.3x flow control is supported on all Ethernet ports operating in the full duplex mode.

802.1p Port Priority

The IEEE 802.1p standard is used to assign a default priority to the frames received without priority information in their tag header, and to map prioritized frames to the appropriate transmit queues.

The default priority-to-queue mappings are shown in Table 1-1. This configuration can be changed by the administrator.

Table 1-1. Priority Queuing Configuration

Priority Indicator	Transmit Queue
7	3
6	3
5	2
4	2
3	1
2	0
1	0
0	1

Switching Options

The 9H531-18 and 9H532-18 provide IEEE Standard-based 802.1 switching or SecureFast Switching Virtual Network Services. In the 802.1 mode (the default mode of operation), the switch functions as an 802.1D switch. When until VLANs are configured, it operates as an 802.1Q switch.

Standards Compatibility

The 9H531-18 and 9H532-18 are fully compliant with the IEEE 802.3u, 802.3z, 802.3x, 802.1Q, and 802.1p standards. The 9H531-18 and 9H532-18 provide IEEE 802.1D Spanning Tree Algorithm (STA) support to enhance the overall reliability of the network and protect against “loop” conditions. The 9H531-18 and 9H532-18 support a wide variety of industry standard MIBs including RFC 1573 (MIB II), RFC 1271 (RMON), RFC 1493 (Bridge MIB), RFC 1354 (FIB MIB), and RFC 1190 (Path MTU Discovery). A full suite of Cabletron Systems Enterprise MIBs provide a wide array of statistical information to enhance troubleshooting.

For information about how to extract and compile individual MIBs, contact Cabletron Systems.

GARP Switch Operation

Some or all ports on the switch may be activated to operate under the Generic Attribute Registration Protocol (GARP) applications, GARP VLAN Registration Protocol (GVRP) and / or GARP Multicast Registration Protocol (GMRP).

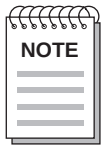
GARP is a protocol, or set of rules, that outlines a mechanism for propagating the port state and / or user information throughout a bridged LAN to keep track of users and VLANs on the network fabric. MAC bridges and end users alike can take part in the registration and de-registration of GARP attributes such as VLAN and multicast group membership.

Management Information Base (MIB) Support

The 9H531-18 and 9H532-18 modules provides MIB support including:

- RMON (RFC 1271)
- IETF MIB II (RFC 1573)
- IETF Bridge MIB (RFC 1493)

and a host of other Cabletron Enterprise MIBs.



For a complete list of supported MIBs, refer to the release notes provided with the 9H531-18 and 9H532-18.

LANVIEW LEDs

The 9H531-18 and 9H532-18 module uses LANVIEW – the Cabletron Systems built-in visual diagnostic and status monitoring system. With LANVIEW LEDs, you can quickly identify, at-a-glance, system status as well as the device, port, and physical layer status. Two LEDs indicate the transmission and reception of data from the INB SmartSwitch 9000 backplane connection. Each of the 18 Ethernet front panel ports features two LEDs per port to indicate the port's Administrative status (enabled / disabled), LINK status (Link / Nolink), and Data Activity (receiving and transmitting data).

Year 2000 Compliance

The 9H531-18 and 9H532-18 module and the SmartSwitch 9000 chassis have an internal clock that can maintain the time and date beyond the year 1999.

Related Manuals

The Cabletron Systems manuals listed below should be used to supplement the procedures and technical data contained in this manual.

SmartSwitch 9000 Installation Guide

SmartSwitch 9000 9C300-1 Environmental Module User's Guide

SmartSwitch 9000 9C214-1 AC Power Supply User's Guide

SmartSwitch 9000 9X5XX Series Local Management User's Guide

Cabling Guide

Ethernet Technology Guide

Network Troubleshooting Guide

WebView User's Guide

SmartTrunk User's Guide

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BBS Modem setting	(603) 335-3358 8N1: 8 data bits, No parity, 1 stop bit
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To send comments or suggestions concerning this document, contact the Cabletron Systems Technical Writing Department via the following email address: **TechWriting@ctron.com** *Make sure to include the document Part Number in the email message.*	

Before calling the Cabletron Systems Global Call Center, have the following information ready:

- Your Cabletron Systems service contract number
- A description of the failure

- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Cabletron Systems products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

Chapter 2

Installing the Module

Install the modules by following the steps described later in this chapter.

Only qualified personnel should perform installation procedures.

Unpacking the Module

1. Carefully remove the module from the shipping box. (Save the box and packing materials in the event the module must be reshipped.)
2. Remove the module from the plastic bag. Observe all precautions to prevent damage from Electrostatic Discharge (ESD).
3. Carefully examine the module, checking for damage. If any damage exists, DO NOT install the module. Contact Cabletron Systems Global Call Center immediately.

User-Accessible Components

Figure 2-1 shows the various components that can be accessed by users. These consist of an eight-position dip switch (explained in the next section), replaceable PROMs, and sockets for memory and flash upgrades. These can be used for future upgrades. Instructions for installing the components are supplied with the upgrade kits.

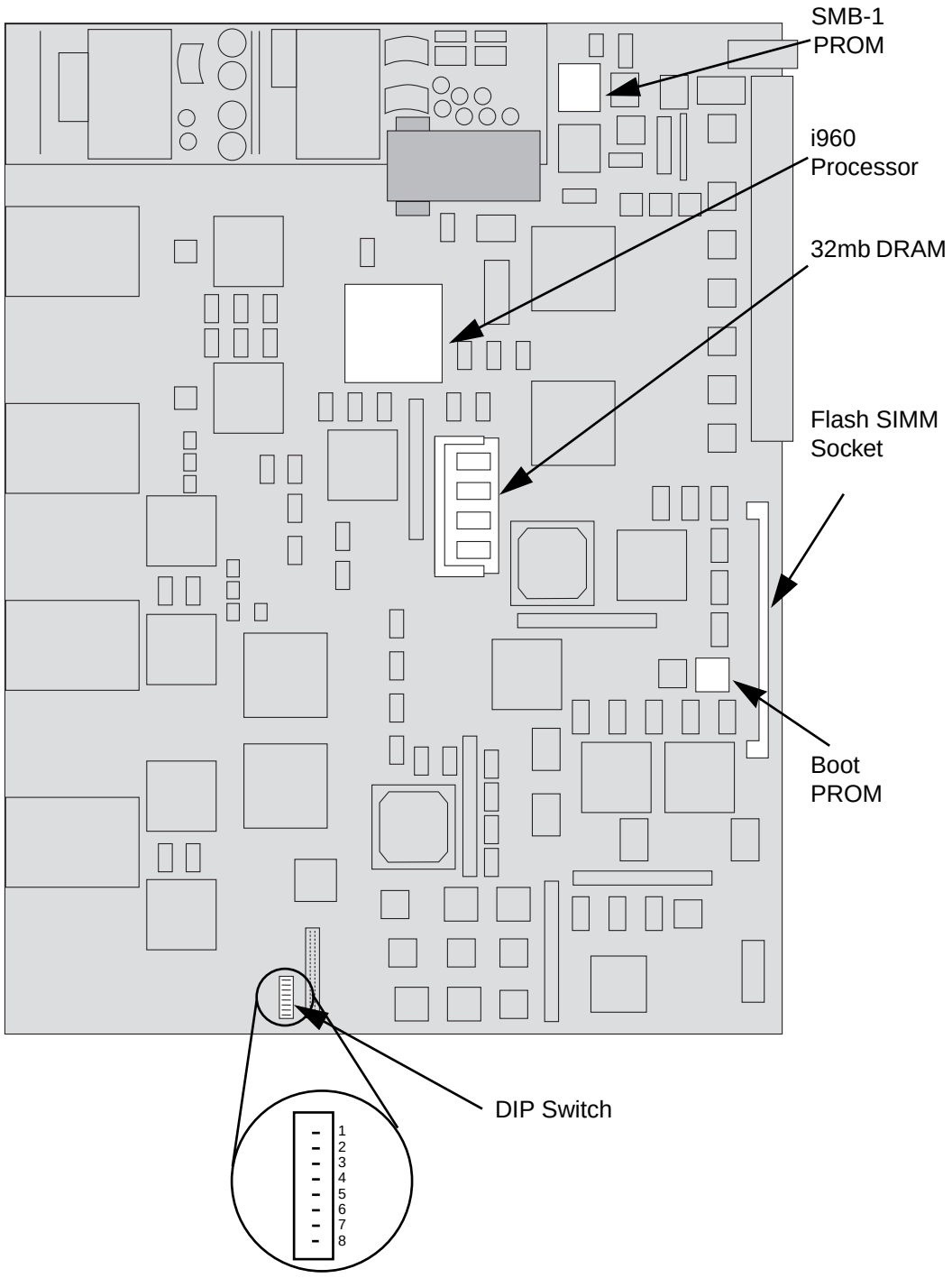


Figure 2-1. User-Accessible Components

The DIP switch on the module (Figure 2-1), is an eight-switch DIP located near the left, bottom corner of the module. Each switch is set according to the functions described in Table 2-1. If switch settings are changed, the processor on the module must be reset, using the reset switch or repowering the module, for changes to take effect.

See the **Cautions** at the end of this table.

Table 2-1. Function of DIP Switch

Switch	Function	Description
8	**Clear Password[-1]**	This module stores user-entered passwords in NVRAM (Nonvolatile Random Access Memory). To clear these passwords, toggle this switch and then reset the module's processor. Once the module resets, factory default passwords are placed in NVRAM. You can use these default passwords or, if desired, enter new passwords. To enter new passwords, refer to the Module Local Management User's Guide.
7	**Clear NVRAM[-2]**	This module stores user-entered parameters such as IP addresses, subnet masks, default gateway, default interface, SNMP traps, bridge configurations and module specific configurations in NVRAM. To clear these parameters toggle this switch and then reset the module's processor. Once the module resets, factory default parameters are placed in NVRAM. You can use the default parameters or, if desired, enter new parameters. To enter new parameters, refer to the Module Local Management User's Guide.
6	**Force BOOTP Download**	This module uses BOOTP (Boot Strap Protocol) to download new versions of the image file into Flash Memory. This procedure forces image files to be downloaded from the PC or Workstation, configured to act as the BOOTP server, connected to the EPIM port in the Environmental Module.
5	**Reserved**	For Factory Use Only
4	**Reserved**	For Factory Use Only
3	**Reserved**	For Factory Use Only
2	**Reserved**	For Factory Use Only
1	**Reserved**	For Factory Use Only

[1]***Caution:*** *Do not toggle Switch 8 unless you intend to reset the user-configured passwords to the factory default settings.*

[2]***Caution:*** *Do not toggle Switch 7 unless you intend to reset the user-entered parameters to the factory default settings.*

Using DIP Switch 6

The purpose of DIP switch 6 is to force a Flash download from a BootP server through the EM-EPIM. The first step in this process is to configure the BootP server. Configurations of BootP servers can differ from platform to platform and from one operating system to another. Read the user's manual on BootP and TFTP serving for the correct files to edit and the correct files to execute for the server. After configuration of the BootP server the module can then have the switch state changed on dip switch 6 to initiate BootP and TFTP requests.

When the state of dip switch 6 is changed, the module begins requesting a BootP server in an attempt to receive a Flash image download. The modules boot PROM initiates a BootP sequence. During this sequence, the module requests an IP address and a filename from the BootP server. The module then requests a TFTP of the file and receives the download of the image. The module will not function until the Flash image is downloaded from the BootP and TFTP server.

If a BootP and TFTP are not intended at this time, this process may be stopped by resetting the module. Resetting is done by pushing the reset button on the module, power cycling the chassis, or removing the module from the chassis and re-inserting. (See section titled **The Reset Switch** on page 2-8.) After resetting, the module again looks for a BootP server, but will time-out after about four minutes. After the time-out the module then boots from Flash memory. The next time the power is cycled, the module will boot from Flash memory and not request the BootP server.

Installing GPIMs

Two GPIMs may be installed into the module. All GPIMs are installed in the same manner, as listed in this procedure.

Refer to Appendix A for cable specifications for the GPIMs.

The GPIMs are installed into the SmartSwitch 9000 module as follows:

1. Attach the antistatic strap (refer to the instructions in the antistatic wrist strap package) before removing the GPIM from the antistatic packaging.
2. Remove the GPIM from the packaging.
3. Hold the GPIM with the network connection port facing away from the SmartSwitch 9000 module. The 20-pin connector should be facing towards the empty GPIM slot, with the wide part of the connector oriented up in relation to the printing on the SmartSwitch 9000 module. See Figure 2-2 to orient the GPIM 20-pin connector.

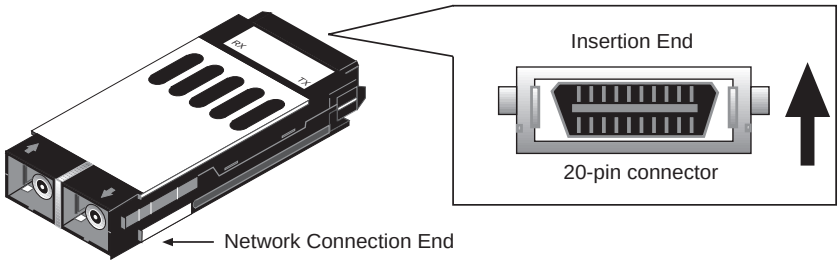


Figure 2-2. GPIM

4. Gently insert the GPIM (20-pin connector side) through the GPIM opening of the SmartSwitch 9000 module, as shown in Figure 2-3. The door folds sideways and the slides engage the sides of the GPIM. If the GPIM does not go in easily, do not force the device. Check the orientation against Figure 2-2. Push the GPIM back until the 20-pin port engages the GPIM. The latch mechanism engages when the GPIM connector seats properly in the port.

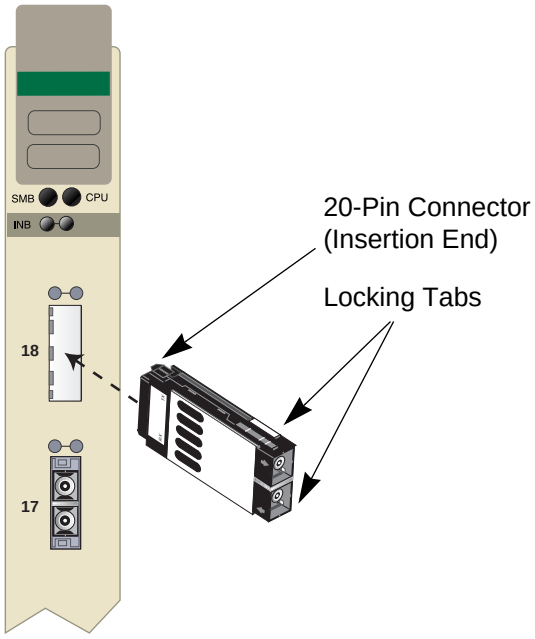
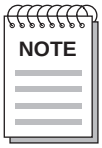


Figure 2-3. Installing a GPIM into the SmartSwitch 9000 module

To remove a GPIM from the SmartSwitch 9000 module, squeeze both locking tabs in towards the center of the GPIM, and pull it out of the port.

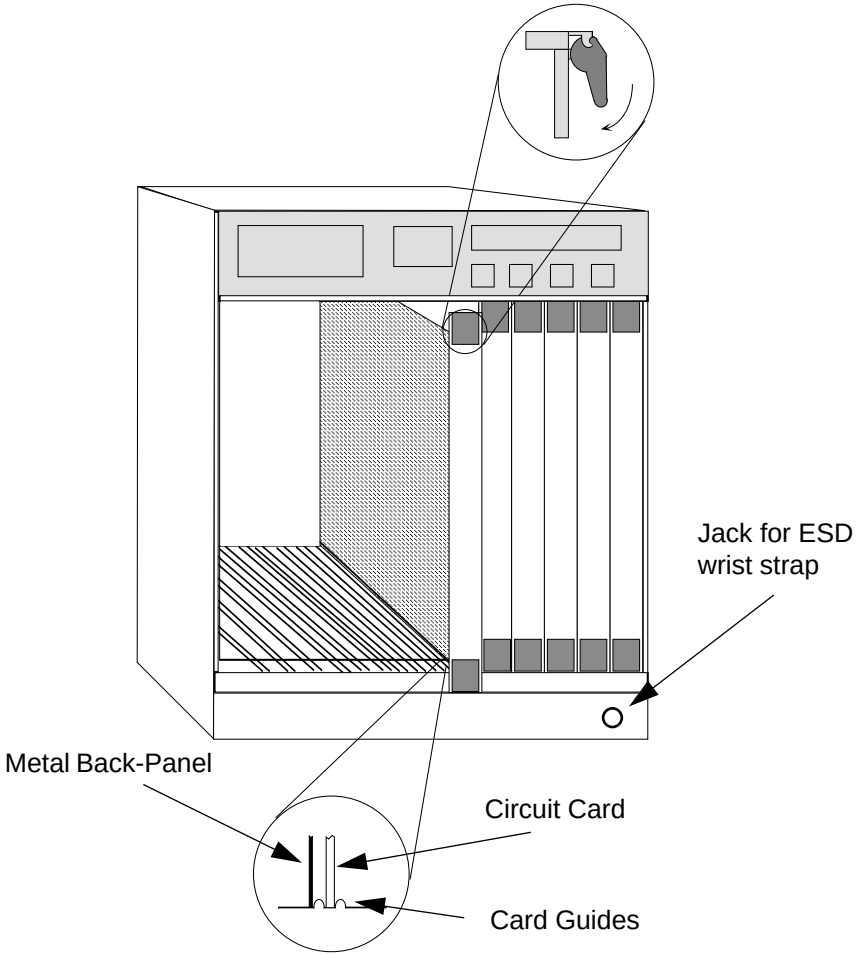
Installing the Module in the SmartSwitch 9000 Chassis

To install the module in the SmartSwitch 9000 chassis, follow the steps below:



The INB Terminator Modules must be installed on the rear of the fourteen slot chassis before powering up this module. The INB Terminator Modules are not required on the six slot chassis. Refer to the ***INB Terminator Modules Installation Guide*** *for information and installation procedure.*

1. Remove the blank panel covering the slot in which the module will be mounted. All other slots must be covered to ensure proper air flow and cooling.
2. Attach one end of the ESD wrist strap (packaged with the SmartSwitch 9000 chassis) to your wrist. Plug the other end into the jack for the ESD wrist strap, located in the lower right corner of the SmartSwitch 9000 chassis shown in Figure 2-4.
3. Slide the module into the slot and lock down both the top and bottom plastic tabs, as shown in Figure 2-4. Take care that the module is between the card guides as shown, it slides in straight, and engages the backplane connectors properly.



Warning:
Ensure that the circuit card is between the card guides.
Lock down the top and bottom plastic tabs
at the same time, applying even pressure.

Figure 2-4. Installing the Module

The Reset Switch

The Reset switch is located on the front panel, under the top plastic tab as shown in Figure 2-5. It serves three functions: resetting the i960 processor, shutting down the module, or restarting the module.

- To reset the i960 processor, press the reset switch twice within three seconds.
- To shut down the module, press and hold the reset switch down for three or more seconds.
- To restart the module after it has been shut down, press and release the Reset Switch.

For security, SNMP management can be used to disable the functions of this switch.

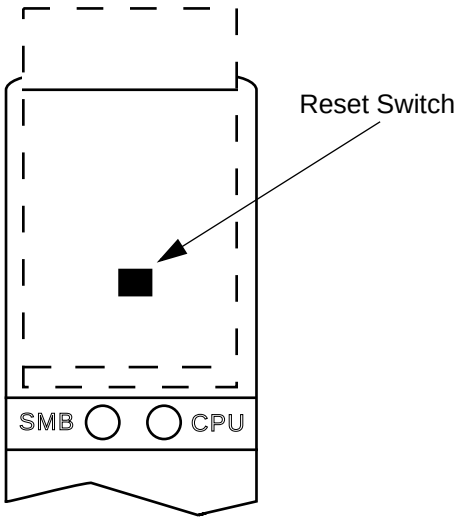


Figure 2-5. The Reset Switch

Cabling Requirements

10BASE-T Network

When connecting a 10BASE-T segment to the front panel ports of a 9H532-18 module, ensure that the network meets the Ethernet network requirements of the IEEE 802.3 standard for 10BASE-T. If a port is to operate at 100 Mbps, Category 5 cabling must be used. For 10 Mbps operation only, Category 3 cabling can be used.

100BASE-TX Network

The 9H532-18 has RJ45 connections that support Category 5 UTP cabling with an impedance between 85 and 111 ohms for 10 and 100 Mbps operation. The device at the other end of the twisted pair segment must meet IEEE 802.3u 100BASE-TX Fast Ethernet network requirements for the devices to operate at 100 Mbps. Refer to the Cabletron Systems *Cabling Guide* for details.

100BASE-FX Network

The 9H531-18 supports 100BASE-FX. When connecting a 100BASE-FX segment to any of the front panel ports, ensure that the network meets the optical performance requirements for 100BASE-FX IEEE 802.3u standard.

The 9H531-18 supports multimode fiber cables at the 1300 nm wavelength, at lengths of up to 2 km.

1000BASE-SX/1000BASE-LX Network

For information about 1000BASE-SX and 1000BASE-LX, see Appendix A.

Chapter 3

Technical Overview

SmartSwitch Architecture

The SmartSwitch Architecture of the 9H531-18 and 9H532-18 modules, as shown in Figure 3-1, is configurable for one of two modes of operation: traditional IEEE 802.1 switching, or SecureFast switching. The module supports only one of these modes of operation at any one time.

When operating in traditional IEEE 802.1 switch mode, the modules make filtering / forwarding decisions based on Destination Address (DA), with standard IEEE 802.1D learning. 802.1Q VLANs are also supported.

Spanning tree operation for the modules is configurable to adhere to IEEE 802.1D, DEC, or none. The default Spanning Tree Algorithm is 802.1D.

When operating in SecureFast switch mode, all filtering / forwarding decisions are made on a DA-SA pair and its in and out port on a connection-orientated basis. SecureFast switching mode provides value-added network services including dynamic VLANs, Topology, Connectivity, IP Multicast, Control, Security, Application, Address Management, Dynamic Mapping, and Directory services. For example, Topology Services includes configurable options ranging from simple spanning tree implementations to fully-meshed active topologies. Other services and features supported in SecureFast switching mode are described in detail in the Cabletron White Paper, **IP Host Communication in Bridged, Routed and SecureFast Networks**.

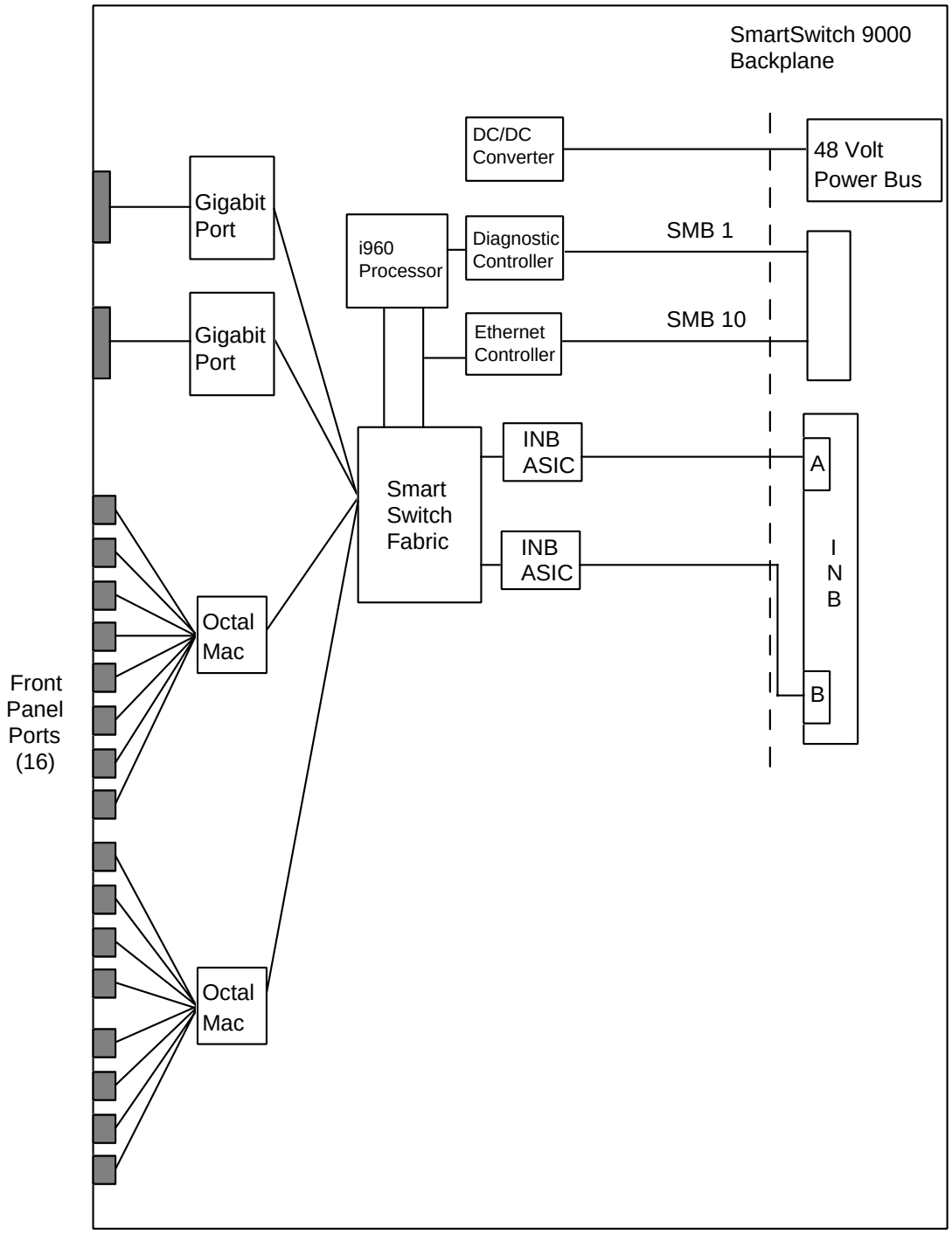


Figure 3-1. Block Diagram

System Management Buses

There are two management channels within the SmartSwitch 9000 system: the SMB-1 and the SMB-10. These buses provide side-band management and inter-module management communication.

SMB-1 Bus

The SMB-1 is a 1 Mbps management bus located within the SmartSwitch 9000. This bus is utilized by all diagnostic controllers in the system including connectivity modules, power supply modules and the environmental module. The SMB-1 transports inter-chassis information between system components, such as power and environmental information, as well as diagnostic messages. Periodic loop-back tests are performed by all modules that share this bus to ensure the validity of SMB-1. In the event a failure is detected on SMB-1, the SMB-10 may be used as an alternate communication channel.

SMB-10 Bus

The SMB-10 is a 10 Mbps management bus located within the SmartSwitch 9000. This bus is used for inter-chassis communication of modules as well as serving as a side-band management channel into the SmartSwitch 9000.

The SMB-10 is externalized from the chassis via an optional Ethernet Port Interface Module (EPIM) located on the front of the Environmental Module. Through an EPIM connection, full-SNMP management of the SmartSwitch 9000 is available side-band from user data. Modules that share the SMB-10 bus periodically send out loop-back packets to ensure the validity of SMB-10. If a fault is detected on the SMB-10, the SMB-1 can be used as an alternate communication channel by the modules.

System Diagnostic Controller

This diagnostic controller is composed of a Z-80 microprocessor and its supporting logic. The diagnostic controller is designed to control the power-up sequencing of modules, monitor the modules' input and output power parameters, keep watch over the main host processor, monitor the temperature, and control the SMB LANVIEW diagnostic LEDs. Although the system diagnostic controller and the main host processor can operate independently of each other if needed, they exchange information about each other's status and overall module condition. The information gathered by the diagnostic controller is available to the network manager via local / remote management and the LCD located on the environment module. The modules are designed to continue functioning in the event of a diagnostic controller fault.

DC/DC Converter

The DC / DC converter converts the 48 VDC on the system power bus to the necessary operating voltages for its host network services module. The diagnostic controller monitors and controls the operation of the DC / DC converter.

INB Interface

Each module attaches to both INB A and INB B and has two INB ASICs. The INB ASICs use 64 byte Ethernet frames for transmission onto the INBs at 66 MHz.

The 9X5XX modules are fully compatible with the the first generation 9X4XX modules. The first generation modules communicate only on INB B using a 56 byte canonical frame format, at 40 MHz. If the newer module detects a first generation module on the backplane, it automatically changes from the fast 66 MHz Ethernet frames, to the first generation compatible 40 MHz canonical frame on INB B only. INB A is used only by the 9X5XX modules and remains at the higher speed.

i960 Core

The i960 core provides modules host services, the SNMP protocol stacks, to support industry standard MIBs, as well as Cabletron enterprise extension MIBs for each media type. Management services, such as telnet, WebView and network address to MAC address mapping, are also provided by the i960 core.

Chapter 4

LANVIEW LEDs

The front panel LANVIEW LEDs indicate the status of the module and may be used as an aid in troubleshooting. Shown in Figure 4-1 are the LANVIEW LEDs of the 9H531-18 and 9H532-18 modules.

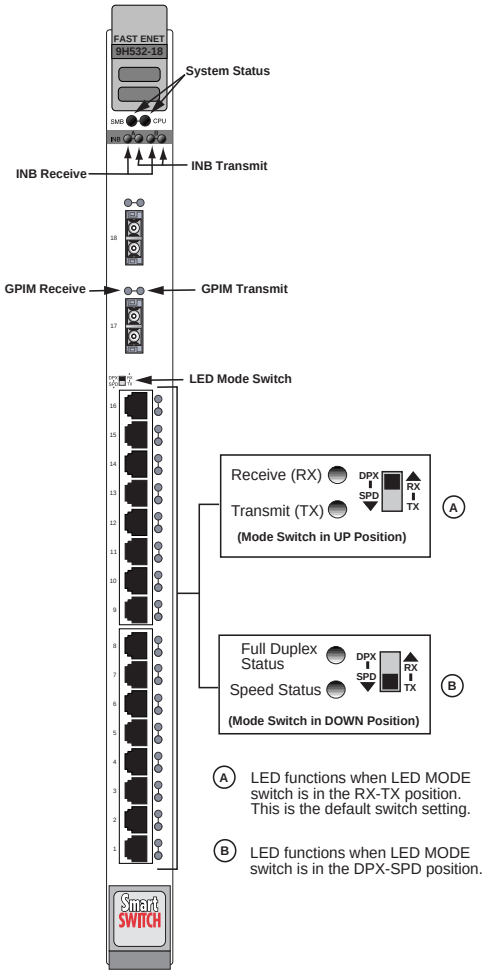


Figure 4-1. The LANVIEW LEDs

The functions of the two System Status LEDs, System Management Bus (SMB) and CPU (Central Processing Unit), are listed in Table 4-1.

Table 4-1. System Status (SMB and CPU) LEDs

LED Color	State	Description
Green	Functional	Fully operational
Yellow	Testing	Power up testing
Yellow (Blinking)	Crippled	Not fully operational (i.e. one port may be bad)
Yellow / Green	Booting	Module is performing its boot process
Red	Reset	Module is resetting
Red (Blinking)	Failed	Fatal error
Off	Power off	Module powered off

The functions of the INB Receive LED are listed in Table 4-2.

Table 4-2. INB Receive LED

LED Color	State
Green	Link, no activity, port enabled
Green (Blinking)	Link, port disabled
Yellow (Flashing)	Link, activity, port enabled (Flashing to steady on indicates rate.)
Red	INB fault, (not synchronized with the Monarch)
Off	No link, no activity (port enabled)

The functions of the INB Transmit LED are listed in Table 4-3.

Table 4-3. INB Transmit LED

LED Color	State
Green (Flashing)	Activity, port enabled (Flashing to steady on indicates rate.)
Yellow (Blinking)	Port in standby state
Red	INB fault
Off	Link (port disabled)

The functions of the Port Receive LEDs are listed in Table 4-4.

Table 4-4. Port Receive LEDs

LED Color	State
Green	Link, no activity port enabled
Green (Blinking)	Link, port disabled
Yellow (Flashing)	Link, activity, port enabled (flashing to steady on indicates rate)
Red	Fault
Off	No link, (port disabled)

The functions of the Port Transmit LEDs are listed in Table 4-5.

Table 4-5. Port Transmit LEDs

LED Color	State
Green (Flashing)	Data activity (flashing to steady on indicates rate)
Yellow (Blinking)	Port in standby state
Red (Flashing)	Collision (with collision rate)
Red	Fault
Off	No activity, port can be disabled or enabled

The functions of the GPIM transmit LEDs are listed in Table 4-6.

Table 4-6. GPIM Transmit LEDs

LED Color	State
Green (Flashing)	Activity, port enabled
Yellow (Flashing)	Port in standby
Red (Flashing)	Transmit fault
Red	Diagnostic failure
Off	No activity, port enabled

The functions of the GPIM receive LEDs are listed in Table 4-7.

Table 4-7. GPIM Receive LEDs

LED Color	State
Green	Link, no activity. Port enabled
Green (Flashing)	Link, port disabled
Yellow (Flashing)	Link, activity. Port enabled
Red	Diagnostic failure
Off	No link, no activity. Port enabled or disabled

The functions of the Speed and Full Duplex LEDs are list in Table 4-8 and Table 4-9. These LED indications are only valid when the LED MODE switch is in the DPX-SPD position.

Table 4-8. DPX Status LEDs (9H532-18 only)

LED Color	State
Green	Port is operating in full duplex mode (20 Mbps or 200 Mbps).
Yellow	Port is in standard (half duplex) mode (10 Mbps or 100 Mbps).

Table 4-9. SPD LEDs (9H532-18 only)

LED Color	State
Green	Port is linked and operating at 100 Mbps.
Yellow	Port is linked and operating at 10 Mbps.

Chapter 5

Specifications

Technical Specifications

CPU

PowerPC
Intel i960 RISC based microprocessor

Memory

8 MB Flash Memory (expandable to 16 MB)
32 MB DRAM (local)
4 MB Memory (shared)

Network Interfaces

16 fixed RJ45 UTP connectors or 16 MT-RJ multimode fiber optic connectors
2 modular Gigabit (GPIM) uplinks

Performance

Module Switch Fabric bandwidth	3.3 Gbps
Module Throughput	2.2 Mpps
Source Address Table	16 K entries

Regulatory Compliance

It is the responsibility of the person who sells the system to which the module will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

This equipment meets the following safety and electromagnetic compatibility (EMC) requirements:

Safety	UL 1950, CSA C22.2 No. 950, EN 60950, IEC 950, and 73/23/EEC
Electromagnetic Compatibility (EMC)	FCC Part 15, EN 55022, CISPR 22, CSA C108.8, EN 50082-1, AS/NZS 3548, VCCI V-3, and 89/336/EEC

Service

MTBF (MHBK-217E)	>200,000 hrs.
MTTR	<0.5 hr.

Physical

Dimensions

35.0 D x 44.0 H x 3.0 W centimeters
(13.8 D x 17.4 H x 1.2 W inches)

Weight

Unit:	4.5 kg (10 lb)
Shipping:	5.4 kg (12 lb)

Environment

Operating Temperature	5 to 40° C (41° to 104°F)
Storage Temperature	-30 to 73° C (-22° to 164°F)
Relative Humidity	5% to 90% non-condensing

Appendix A

GPIM Specifications

This appendix lists the specifications and regulatory requirements for GPIMs and the media they use. Cabletron Systems reserves the right to change these specifications at any time without notice. The available GPIM options include the GPIM-01 and GPIM-09. The GPIM-01 and GPIM-09 are both fiber optic devices with an SC connector. The GPIM-01 supports multimode (MMF) fiber cable, and the GPIM-09 supports both multimode and single mode (SMF) fiber cable.

GPIM-01 Specifications (1000Base-SX)

The following specifications for the Gigabit Ethernet GPIMs, listed in Table A-1 though Table A-7, meet or exceed the IEEE 802.3z specification.

Table A-1. GPIM-01 Optical Specifications

	62.5 µm MMF	50 µm MMF
Transmit Power (minimum)	-9.5 dBm	-9.5 dBm
Receive Sensitivity	-17 dBm	-17 dBm
Link Power Budget	7.5 dBm	7.5 dBm

Table A-2. GPIM-01 Operating Range

	Modal Bandwidth @ 850 nm	Range
62.5 µm MMF	160 MHz / km	2-220 Meters
62.5 µm MMF	200 MHz / km	2-275 Meters
50 µm MMF	400 MHz / km	2-500 Meters
50 µm MMF	500 MHz / km	2-550 Meters

GPIM-09 Specifications (1000Base-LX)

Table A-3. GPIM-09 Optical Specifications

	62.5 µm MMF	50 µm MMF	10 µm MMF
Transmit Power (minimum)	-11.5 dBm	-11.5 dBm	-9.5 dBm
Receive Sensitivity	-20 dBm	-20 dBm	-20 dBm
Link Power Budget	8.5 dBm	8.5 dBm	10.5 dBm

Table A-4. GPIM-09 Operating Range

	Modal Bandwidth @ 1300 nm	Range
62.5 µm MMF	500 MHz / km	2-550[A] Meters
50 µm MMF	400 MHz / km	2-550[A] Meters
50 µm MMF	500 MHz / km	2-550[A] Meters
10 µm SMF	N / A	2-10000 Meters

[A] In order to obtain the distance of 550 m for the GPIM-09 using multimode fiber, Launch Mode Conditioning cable must be used.

Physical and Environmental Specifications

Table A-5. GPIM Physical Properties

Dimensions	1.2 H x 3.4 W x 6.5 D (cm) 0.47 H x 1.34 W x 2.56 D (in)
Weight	25 g (0.88 oz)

Table A-6. GPIM Environmental Requirements

Operating Temperature	5°C to 40°C (41°F to 104°F)
Storage Temperature	-30°C to 90°C (-22°F to 194°F)
Operating Humidity	5% to 90% (non-condensing)

Regulatory Compliance

The GPIMs meet the following safety and electromagnetic compatibility (EMC) requirements:

Table A-7. Regulatory Compliance

Eye Safety (fiber GPIMs only)	FDA CDRH 21-CFR 1040 Class 1, IEC 825 Issue 1 1993:11 Class 1, CENELEC EN 60825 Class 1